

REPORT

OF

GEOLOGICAL SURVEY OF PARKE COUNTY.

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TOPOGRAPHY.

Parke county is bounded on the north by Fountain county, on the east by Montgomery and Putnam; on the south by Clay and Vigo, and on the west by the Wabash River, which separates it from Vermillion county.

It embraces the townships 14, 15, 16 and 17 north, and ranges 6, 7 and 8, and the eastern sections of range 9.

Rockville, the county seat, is in latitude 39 degrees and 40 minutes, and it is about 10 degrees west longitude from Washington City. The county contains an area of about 480 square miles.

Its general drainage is to the southwest. The Wabash, along its western margin, receives an unusual amount of tributaries from this county. But few counties in the State are as well watered. Its principal streams are the Big and the Little Raccoon, Sugar creek, Wabash and Mill creek, and Coal creek enters it in the extreme northwest. These streams all flow into the Wabash. The tributaries of Big Raccoon are chiefly from the north, and are Leatherwood, Rock run, Little Raccoon and Green creek. Little Raccoon receives Williams and Sand creek. Sugar creek

receives Rush creek, Roaring creek and Sugar Mill creek. The latter receives Green creek.

The Wabash has cut its channel down through the surface strata about two hundred and fifty feet, and its tributaries afford the geologist in many places, especially where the sand stone is not friable by exposure to the weather, an excellent opportunity to discover the thickness and character of its coal, clay and stone. The upper Big Raccoon, Sugar creek, Roaring creek and Sugar Mill creek wind in many places through deep gorges, and their banks afford the lover of nature much pleasure and admiration by their bold and massive cliffs and romantic rock houses. Turkey run, the Pinnacle, the Devil's Den, etc., are highly attractive places. When these wild and beautiful streams are made accessible by railroads, they will be found in many respects superior to any other rural scenery in the State.

The streams of Parke county generally widen their valleys as they approach their confluence. The Big and the Little Raccoon have for many miles a valley breadth of near one mile. Their valleys contain precipitated alluvium from the rich soils of the table lands, and are unsurpassed in fertility. The Wabash valley in like manner extends from one to two miles eastward. The forests have, to a great extent, been removed from these "*river bottoms*," and they are annually covered by contiguous maize fields, which often present an unbroken continuity of waving grain for miles on either side.

The surface of the table lands of the county are generally gently undulating. There are but few *sloughs* or *ponds*, and but a comparatively small portion of the county so precipitous that it can not be cultivated.

GEOLOGY.

CENOZOIC GEOLOGY.

The carboniferous strata of Parke county are covered by drift. This drift generally consists of red clay, sand and

gravel as a surface deposit. The red clay often gives place to a dark carbonized soil analagous to that of the upland prairie. In the flat beech land it is generally a pale tenacious clay, well adapted to grass and but little inferior in utility, with proper cultivation, to the river bottoms for corn and it is superior for wheat. These clays are so well combined with sand that the soils of Parke county easily pulverize and are every way desirable for cultivation. In many places, sand and gravel deposits are found showing that the rush of waters that brought them was not uniform in its movements nor in its deposits. These sands and gravel banks are interstratified. Coarse gravel, coarse sand and fine sand give place to each other often without regard to any law of superposition, and often sand deposits show ripple marks giving evidence of a lake which moved its sands by waves as well as currents.

The sand and gravel banks are most abundant along and in the bluffs and valleys near the Wabash, but are often found throughout the county.

A sandy soil prevails along and between the two Racoons from Bridgton to Rosedale and along the southwest border of the county. Deep sandy ridges and valleys prevail in the northwest part of the county between Sugar creek and Cole creek. The indications favor the presumption that the movements of the waters depositing the drift varied in direction and velocity, and that the material was brought at different periods and from localities remote from each other.

Under this surface drift is a deposit of blue clay which is general throughout the county, except where cut through by river channels. This blue clay is from three or four to forty feet thick or more. When wells are dug through it, unless walled, it will cave in, in rectangular prism shaped blocks.

The waters which brought the blue clay from whatever country must have had something to do with the glacial action which cut or crushed a way through the coal and sandstone deposits, since it contains almost every variety of

material. Wood, sandstone, limestone and granite pebbles, gravel and sand of various degrees of fineness, broken fragments of coal, everything remote or near has been gathered up and borne along in the general movement of the waters or ice flow by which it was deposited.

A stratum of sand or gravel is generally found under the blue clay. When wells are dug down to it, an abundance of good, unfailing water is usually found, which will rise several feet above the bottom of the well.

Large pieces of timber are often found buried deeply in these clays; and I am reliably informed that in the north-east part of the county a well digger found what appeared to be the corner of a building. The timbers found bear strong resemblance to the fiber of the cedar and pine. In a few places mastodon teeth and fragments of bones and tusks have been found. No doubt if the pioneer citizens of the county were organized into an antiquarian association, many objects and facts of interest could be gleaned from them which would be of material value to the scientist, the geologist, and the antiquarian.

There are other topics intimately associated with this department of my Report which I prefer to include in what I may say on Soils and Timbers.

PALEOZOIC GEOLOGY.

The stratified rocks of Parke county belong to Paleozoic time. It exposes almost, if not fully, a complete series of the regularly recognized coal seams found in the State. Many of these seams exist only in the southwest part of the county, in the highlands of Wabash and Florida townships. Four, if not five, coal seams crop out west of Rockville, Catlin, and Rosedale.

The following exhibit is made out from an exposure in a valley entering the Big Raccoon at Mecca, on land owned by Lowry and Batman, which affords bold, nude walls nearly all the way from its first depression from the table lands to the river bank, and cutting the strata to a depth of about one hundred and fifty feet. East of Rock-

ville the thickness and succession of the stratification is inferential, no positive data being at command to determine it. It is taken from exposures north and south of a line east of Rockville. The strata west of Rockville can be pretty accurately determined by the exposures on Big Raccoon, Leatherwood, and Rock Run or Iron Creek :

GENERAL SECTION OF THE ROCKS IN THE MIDDLE OF
PARKE COUNTY

Made from outcrops along the line running east and west through Rockville from the Wabash river to Putnam county, commencing with the surface drift, in a ravine near Mecca, which cuts through the strata to a depth of near 150 feet, and in which the rocks are well exposed. This exposure is on land owned by Lowry and Batman, in sections 14 and 15, township 15, range 8 :

- No. 1. DRIFT—Red clay, blue clay and gravel 30 to 60 ft.
- No. 2. COAL—Opened, not worked. The roof
is not determined. The cropping indicates
good coal..... 4 ft.
- No. 3 SANDSTONE—Massive, excellent quality
The Clinton Iron Furnaces were made of it.
The best stone in the piers of the canal
aqueduct at Armiesburg were obtained here.
It resists well the action of both fire and
weather. Its color is cream-yellow or a flea-
bitten fawnskin. Portions of it are a rich
brown. It quarries to any desirable size and
shape..... 40 ft.
- No. 4. BLUE CLAY—With nodules of iron ore.
The ore is not abundant..... 15 ft.
- No. 5. COAL—A double seam. Each stratum
1 foot, separated by a stratum of blue clay of
from one to six inches..... 2 ft.
- No. 6. FIRE CLAY—With kidney iron ore.
Ore under as well as through it..... 4 ft.
- No. 7. GRAY SANDSTONE..... 2 to 3 ft.

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| No. 8. BLUE CLAY—With a small quantity of kidney ore..... | 20 ft. |
| No. 9. COAL—Good, bituminous..... | 3 ft. |
| No. 10. FIRE CLAY..... | 3 ft. |
| No. 11. SANDSTONE—A good building stone. Gray, yellow and brown with specks of oxide of iron..... | 4 ft. |
| No. 12. BITUMINOUS SHALE.—With thin seams of coal..... | 4 ft. |
| No. 13. SANDSTONE—Blue and gray and in thin strata..... | 2 ft. |
| No. 14. BLUE CLAY—With iron ore more abundant than in seams above..... | 5 ft. |
| No. 15. LIMESTONE—In layers from three to eight inches..... | 2 ft. |
| No. 16. COAL—Associated with this seam are irregular shaped sextaria nodules of pyritous iron ore, generally small, but here four to five feet long, and two to three feet across. This coal indicates identity with the cropping at Armiesburg bridge. Inferior quality. I take it to be identical with the seam at Woodward's and Butler's mines, and at R. Outland's or Leatherwood. At each of these places it affords a superior, rich, bituminous coal much prized by smiths..... | 2 to 4 ft. |
| No. 17. SANDSTONE—Underlaid by a ferruginous claystone and in places runs into fire clay | 8 to 15 ft. |
| No. 18. COAL—Rich, bituminous. Often contains too much sulphur. It shows above low water mark at the bridge at Armiesburg. I take it, and the seam above, to be identical with coal at Clinton Locks, and at Steele's mines, at Rosedale and at Roseville, in "the general section of the coals" given by Professor Cox in his report for 1870, marked L.... | 4 to 6 ft. |
| No. 19. BLUE CLAY—Thickness not known... | 20 to 25 ft. |

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| No. 20. BLACK LIMESTONE—Sand creek, upper seam K..... | 4 ft. |
| No. 21. COAL—Semi-block..... | 4 ft. |
| No. 22. SHALE..... | 25 ft. |
| No. 23. BLOCK COAL—Crops out below K at Sand creek, and is mined by Nye & Co. I, or main block..... | 3 ft. |
| No. 24. FIRE CLAY..... | 10 ft. |
| No. 25. SOAPSTONE..... | 6 ft. |
| No. 26. SANDSTONE—Yellow..... | 20 ft. |
| No. 27. BLUE SANDSTONE..... | 2 ft. |
| No. 28. GRAY SANDSTONE..... | 5 ft. |
| No. 29. SANDSTONE—Massive, millstone grit. At Mansfield it is a beautiful reddish-brown. | 40 ft. |
| No. 30. DARK SHALE..... | 6 ft. |
| No. 31. COAL..... | 1 ft. |
| No. 32. FIRE CLAY..... | 0 ft. |
| No. 33. FERRUGINOUS LIMESTONE—On Big Raccoon..... | ? ft. |
| No. 34. LIMESTONE—Subcarboniferous. This formation extends eastward through Putnam county..... | |

The last ten strata are inferential, being taken in part from borings in different localities.

There is much variation in the thickness and character of the rocks in different places. The section here presented will, however, afford a general idea of the successive deposits which make up the surface material of the county to a depth of perhaps 250 feet measured from the table land east of the Wabash river. Eight seams of coal, most of which are workable, measuring in the aggregate more than 20 feet, here lie buried, waiting for the miner.

GENERAL OBSERVATIONS UPON THE COAL, IRON ORE AND SANDSTONE IN THE PORTIONS OF THE COUNTY EXAMINED.

I commenced my reconnoissance in Florida township, at

Clinton Locks. Three coal seams crop out at this place, which I take to be N, L and I of Prof. Cox's corrected section of coal measures, page 168, Report of 1870.

The upper and middle seams were worked many years ago when the Wabash and Erie canal afforded transportation. Much of the supply of Terre Haute and above was from this place. The upper seam measures four feet; the middle one five feet. The lower seam has recently been found in the bed of a stream on the land owned by J. M. Wilson. The upper and middle are separated by about twenty-five feet of bituminous clay slate, and the middle and lower by about twenty feet of shale. The middle vein has afforded the main source of supply. Since the canal has ceased to afford transportation, but little mining has been done here. It is a rich caking coal, but has too much sulphur for smelting purposes.

The lower seam had not been mined sufficiently to determine its thickness. It indicated a good block coal.

These veins dip to the east at the rate of forty feet to the mile, and to the north at the rate of twenty feet, showing a reverse order to the ordinary dip, which is about twenty degrees south of west, and at an average of about twenty feet to the mile.

The table land above is about seventy-five feet above the general level west of the Wabash, as ascertained by observations of J. T. Campbell, former county surveyor, who happened to be engaged in a survey of that locality about the time of my visit.

The bed of the middle coal seam is about five feet below the level of Montezuma, as shown by a railroad survey running near it. The outcrops were not sufficiently clear to enable me to ascertain the greatest depression of the seam northward. It evidently rises and reappears at Butler's mines, near the mouth of Leatherwood, and at Mecca, in Wabash township.

MECCA AND RACCOON VALLEY.

Crossing the ridge to Mecca in Raccoon valley, I found

the interesting exhibit of the first seventeen strata, presented in "The General Section of the Rocks in the Middle of Parke county."

This ravine affords an interesting variety of material both for the miner and the scientist. Seam number 3 is represented by forty feet of sandstone. It shows but ten or fifteen feet here, but half a mile south it is about forty feet thick and a very superior building stone. It can be quarried to a desirable size and shape and will yield well to the hammer and chisel.

In many places down this valley kidney iron ore is abundant, and several coal seams may be advantageously worked. The home demand has hitherto been so small on account of its inaccessibility, that but little mining has been done.

Corresponding coal seams and sandstone appear on the west side of the Raccoon on the lands of William Hixon, and at other points in that vicinity.

Ascending the Raccoon valley half a mile south of Mecca, I found kidney ore abundant and much of it sufficiently rich to invite the attention of iron manufacturers. Coal is occasionally seen cropping out in the ravines, but the exposures were not such as to enable me to determine their thickness, roofing or quality. For several miles above Mecca there are no bold projecting cliffs along the stream until we reach the vicinity of Roseville.

In section 5, on lands owned by Allen Lewis and John W. Mark, two veins of coal appear, each about three feet, also an excellent quality of yellow sandstone. The railroad which will soon be completed from Carbon to Chicago via Danville, Ill., will offer an incentive to the owners to develop it more fully. These coals I take to be L and M, and correspond with those at Roseville and Rosedale.

About one mile northwest of Roseville the same two veins are found on land owned by W. Evans and G. W. Bement. The lower seam is five feet six inches. I was unable to procure fair samples of it, but it is represented to be a good coal, burning to a brown ash with but little clinker. The

earth had caved in upon the mine when I visited it, so that I was unable to inspect it.

I consider this lower seam identical with the coal east of Catlin, at Beal's mines, and marked I. It crops out at the water's edge at Roseville. It will probably be a good block coal, from indications where opened, and from its thickness ($4\frac{1}{2}$ feet) will no doubt prove of much value when the railroad down the Raccoon valley is completed.

At Roseville is a fine exhibition of carboniferous sand stone, or millstone grit.

At Roseville is a fine exposure of carboniferous or conglomerate sandstone. It has the appearance of a ridge of stone, which in the carboniferous period extended above the waters in which the coal plants grew, and on either side of it the coal and shale seams are fitted to its sides without a variation in their level. North of the stream it presents a bold, rugged cliff, from which has been taken much valuable building stone. On its crest is a beautifully white, friable sandstone, which finds its way to Terre Haute and Indianapolis for the manufacture of glass. Portions of it are damaged by peroxide of iron, which changes it into a rich red color, and destroys its market value for glass. I shall not be surprised to hear of this stone being sought by Chicago and Indianapolis. It is a soft stone and readily quarried, but hardens on exposure, and is every way desirable as a superior building material.

The Big Raccoon, a mile or two above this place, has evidently once in a time had a channel by Rosedale southward, down a wet, low prairie which passes east of Terre Haute and enters the Wabash some miles below the city. By one of those wonderful disturbances among the rocks, for which our earth has been remarkable, a channel has been opened for it northward to Armiesburg, across a high ridge composed of stratified rocks, where it enters the Wabash about twenty miles above its former confluence.

Perhaps about the same time, and while great changes were going on in Parke county, for nature's dynamic forces have distorted and disturbed it much, especially in Florida,

Wabash, Reserve, and Penn townships, Leatherwood, which evidently once ran from Bloomingdale across through the present valley of Rock Run, found a new channel opened for it through the highlands west of Joel Reynold's place, across the lands now owned by J. Parker, H. Little, P. Pearson, and P. Mitchell, and it re-unites with the Rocky Run valley near its intersection with the plank road leading from Rockville to Montezuma. The old bed of Raccoon is now occupied by the Terre Haute and Crawfordsville Railroad, and its present valley has invited a branch of the Chicago, Danville and Vincennes road through it in quest of the block coals in southern Parke and Clay counties.

Coal I, described above, passed out of view under the stream above Roseville, and K and L crop out along the hillside above to Rosedale, where Gen. G. K. Steele has had entrances which have yielded a large supply for market by the Evansville and Crawfordsville Railroad. The seam here works about five feet, but is not sufficiently free from sulphur to be desirable for smelting ores. It is a good coal for steam and grates, and corresponds to the coal at Clinton Lock. It has not, however, been convenient for him to continue his mining operations for the past two years, and when I visited the place no coal could be seen which would indicate its character. These seams show very favorably above Roseville, where they have been successfully mined for many years.

Opposite Roseville, above and below the ridge of millstone grit, or conglomerate sandstone above described. The same coal makes a good showing on the lands of Evans and Hawkins. The demand has not hitherto been sufficiently great to develop its qualities. When avenues to the markets are opened, there will be found sleeping in these hills material wealth that will reward the industry of many generations.

Adjacent to this coal is a superior massive sandstone. It is of a cream yellow and brown color. It yields well to the hammer and chisel, and can be readily procured of any desirable dimensions. It extends for some distance up the

valley of Rock Run, making majestic, overhanging moss-covered cliffs. I shall not be surprised to see, some day, a switch from the Raccoon Valley Railroad span that stream to reach this waiting and inexhaustible supply of building stone.

Passing up the valley of Rock Run about two miles, these rugged, romantic, precipitous banks, begin to mellow into soil covered hills, and at section 3, township 14, range 8, on the lands owned by Daniels and Bailey, the seams L and K again make their appearance, rising as we go northward more rapidly than the stream. Its roofing is a silicious and clayey, and in many places ferruginous limestone, bearing marks of identity with the coal on S. Woodard's place in Rock Run valley, and at Butler's mines.

Kidney iron ore is very abundant along this valley. It would afford a good supply for admixture with the Superior ore,

A seam of fire clay about eight or ten feet thick separates the two coal seams. The upper coal is about two feet thick and the lower, as nearly as I could ascertain, is about four feet.

Two miles north, in Wabash township, on H. H. Anderson's land, section 27, township 15, range 8, the upper seam measures twenty inches, and the lower seam is in the bottom of the stream and the thickness is not ascertained. It is considered very desirable by smiths who have used it.

In section 14, I found a very abundant supply of iron ore imbedded in blue clay. The stratum is about thirty feet thick. The ore is not so rich as abundant. It would not probably pay to work alone. Leaving this point we find but few exposures that would attract attention until we reach the table lands.

RACCOON TOWNSHIP.

Crossing Little Raccoon near its mouth and passing up the north side of Big Raccoon, a more delightful valley is rarely seen. A rich, gently undulating, sandy soil fills the space between these rivers for some two or three miles, when

hills and stratified rocks are found on the left and a continuous expanse of valley extends to Mansfield. Its breadth is generally about one mile.

In sections 29 and 30, there are croppings of coal but little attention has been given them. In section 7, on Jackman's land, two seams appear. The upper one has a roofing of carboniferous limestone containing *Encrinite* stems, *Bellerophon carbonarius*, *Chonetes mesoloba*, *Athyris*, etc., corresponding with the coal on S. R. Beal's land, on the south side of Little Raccoon.

The upper seam is about four feet thick and yields an excellent coal. It is bituminous but a semi-block. It may be found to answer for smelting purposes.

Under this are strata of fire clay and shale, at the base of which is a stratum of encrinite limestone and a second seam of coal underlying it in bed of stream, the thickness of which was not determined. This locality is very inviting to the miner and manufacturer, and when approached by the North and South Railroad will yield a good and satisfactory supply for market.

In the branch, about half a mile northwest, is found a very interesting exhibition of Amygdaloid or Trappe formation of iron ore. It consists of horizontal strata of cubical, wedge shaped, and quadrilateral prism shaped blocks and bars of ore, generally about one inch in diameter. Some of these bars are a foot long. The bottom of the branch is spanned by this stratum of ore.

In sections 3, 4, 5 and 8, on both sides of the Little Raccoon, on land owned by Samuel R. Beal, Calvin Gilkerson and others, there is an abundant show of excellent coal. It varies in thickness from four to five feet six inches. The N. & S. Railroad survey passes through this region. Two veins, I and K, are found, evidently corresponding to Jackman's and Sand creek coals. They have been but little mined south of Raccoon, on account of the small demand near by and the difficulty of reaching the market. Along the railroad survey, passing over the hill towards Bridgton, the same seams are found, promising a good yield on the

north side of Big Raccoon. In these several localities, a good article of kidney iron ore is found in varied abundance, with copious deposits of fire clay.

In sections 34, 35 and 36, in the southeast part of the county, coal I, a good block coal, is mined. Much of these lands is owned or leased by companies for mining purposes. The N. & S. Railroad survey passes through this locality. The coal seen is mined in beds of streams or along their banks, and are covered with drift. Their proper roofing is not discoverable; their thickness is about four feet. A "lead mine" legend is remembered with interest in this vicinity. The Indians, in an early day, are said to have found an abundant supply of lead on or near section 36, which they melted and ran into bullets. They kept the locality a profound secret. The penalty for showing it to the white man, was cutting out the tongue. When they were preparing to leave for the far west, much importunity was used and rewards offered for its discovery, but in vain; they claimed that the Great Spirit gave it to the Indian and increased the supply as fast as he used it, and if he let the white man have it he would use it all up and the Great Spirit would not furnish a supply for him. There has been much searching for the hidden treasure, but no one has been able to find it.

JACKSON TOWNSHIP.

There are few favorable exposures of coal in this township. The southwest corner comes within the general coal field, and in section 32, I am told, a five feet seam of coal is found. I was unable to reach it. A good showing of coal was discovered on Clear creek, in section 22, on the land of J. N. Bell, which, when worked, may be found desirable. On Mr. Peech's place, in section 14, is found an eleven-foot seam of rich bituminous shale, which, when worked sufficiently deep, assumes a solid, compact form and breaks with a cannel coal fracture. It burns well, but leaves a slaty ash. It has been mined in the bottom of the stream, but at the time of my visit none but weathered specimens could be seen.

In this vicinity may also be found fire clay of fine texture resembling "slip clay." I understand its qualities have not been fully tested. A good showing of fire clay is also found half a mile north, on Bullion's land. A similar showing is found on the farm of Calvin Pruitt, in section 4.

No doubt, by boring and surface examination, good coal seams may yet be found in the western part of this county.

The limestone makes its appearance in the bottom of Big Raccoon, just above where it crosses the line between Jackson and Union townships. Near this locality, in Union township, in section 33, a ten-inch seam of coal is found under a dark shale. From its locality, I infer that it is the lowest of the coal seams of the county.

Iron ore is abundant in many localities in this township, especially on Clear creek.

By far the most desirable mineral in this township is its sandstone. In the vicinity of Mansfield is found in very great abundance a beautiful massive, solid, durable, brownish-red sandstone. It can be quarried in blocks of any desirable size or thickness. It is of a uniform color, and dresses to a good finish. I think it has no superior.

This township is generally hilly and the banks of many streams are continuous walls of carboniferous or conglomerate sandstone. It is most generally a yellowish-brown. It assumes all kinds of fantastic faces—cliffs, "rock houses," honey comb and barnacle surface, and very generally an antique moss-covered exposure, showing how perfectly it can resist alike the decomposing power of frost and air. This township would afford ample business for a railroad to Indianapolis or Chicago in the transportation of its superior and inexhaustible building material. I shall speak of its superior timber in another place.

UNION TOWNSHIP.

But little coal is found in this township. I have mentioned a ten-inch seam in section 32, under a dark bituminous shale. The same coal appears in section 22, on J.

Martin's place. A seam is also found in section 27. The thickness I could not learn. The same nine-inch seam crops out in a branch, half a mile south of Hollandsburg, on J. O. Stout's land, but 25 or 30 feet under it is a fine display of limestone in the bottom of the branch. In section 3, on S. Burke's place, about two and a half miles north of the latter place, is a very fine cropping of a three-foot seam of good block coal. Limestone, about 15 or 20 feet, under it, is in bottom of the branch. The same seam shows equally well half a mile north, on Carver's place.

About half a mile south of Bellmore is a fine display of iron ore, on Miller's place. All the way up Raccoon valley, massive, yellow, conglomerate sandstone is seen, and limestone is usually present in the bottoms of the valleys. These limestone exposures correspond with the Putnam county formation, and assure us that we here reach the downward limit of the coal deposits.

ADAMS TOWNSHIP.

In section 25 and 26, on J. Beard's and J. Neven's land, is found a very good coal. I was unable to reach it. Its qualities were spoken of in very high terms by different and disinterested gentlemen. As nearly as I could learn, these coals measure about three feet. In sections 32 and 33 are found Beal's mines, north of Little Raccoon, and marked I upon the map. This coal measures about five feet. The North and South Railroad passes over it. It was not worked when I visited it. It is under the drift, and but a few feet below the surface in the Raccoon bottoms. An old entrance had been abandoned, and a new one more convenient commenced. When the North and South Railroad shall be finished, I expect an active business will be conducted in this locality in mining and in iron manufacture, lying as it does contiguous to an unfailing supply of water in Little Raccoon.

As we advance up Williams creek, along the line of the North and South Railroad to Rockville, iron and coal ore

are frequently exposed. A. Pickard is just opening an excellent seam in section 17. The same seam has furnished Rockville for some time past with a good article of semi-block coal from Walker's place, one mile above. The latter has too much sulphur for smelting purposes, but answers well for grates and steam. It is marked K upon the map, and I take it to be the upper seam of Sand creek. It is mined in a branch, and I was unable to ascertain the character of its roofing. It measures about four feet. About half a mile east of Rockville, it is found in the bed of Williams creek, and again in section 5. In sections 26 and 35 this coal is found on Beard's land. The sample shown me was very superior. I have no doubt but that it underlies the entire township. Wood is too abundant to warrant the expense of mining by a shaft, and the miner must wait until some avenue can be had to bear it to a distant market.

In Little Raccoon valley, east of Rockville, is found a very superior quarry of carboniferous sandstone. It quarries into any desirable blocks. It has a very sharp grit, and is excellent for grindstones. In some places it is beautifully white, in others red, brown and yellow. It resists the action of frost and air well, and is a very desirable building stone.

WASHINGTON TOWNSHIP.

I shall only speak here of that portion of the township which is drained by Little Raccoon. In sections 34, 33, 27 28 and 21, along the valley of Sand creek, are found two coal seams, marked on the map K and I. The upper is roofed by a carboniferous limestone. Under it is fire clay and shale, and about twenty-five feet under it is a three-foot seam of block coal. The seam K is variable in quality. It generally yields a superior bituminous semi-block, but in some places it has too much sulphur for smelting purposes. The block coal seam has not yet been mined sufficiently to test its qualities. It bids fair, however, to take a favorable place in the market. Very extensive operations are here

conducted by Nye & Company, and the Parke County Coal Company, by means of the transportation offered by the Logansport, Crawfordsville and Southwestern Railroad. A large number of mines are worked for neighborhood supply, in croppings along the hillsides. An analysis of these coals will appear elsewhere in a tabulated form.

In sections 14, 23 and 24, northwest of Judson Station on the Logansport, Crawfordsville and Southwestern Railroad, is a continuation of the Sand creek coal seams. Their paleontological characters are the same. They are here accompanied by an abundance of good kidney iron ore on the lands of A. Buchanan, Esq., where also is found an interesting display of band ore. The upper seam measures about five feet, and is pronounced by Professor Foster, of Chicago, the richest ore in the Indiana coal fields. (See table of Analysis.) It lies there waiting for a switch and the miner. Excellent sandstone is found in the hills in this locality. It is generally gray and yellow. I found here some interesting specimens of *Sigillaria*. Limestone makes its appearance in the bottom of Raccoon, a little below Judson.

GREEN TOWNSHIP.

Coal makes its appearance in the southwest part of this township, in section 31, on lands owned by J. Marks. It is a very flattering outcrop of a five-foot seam of block coal. In a valley half a mile south, two seams are found; the upper about three feet, and the lower two feet. One of the surveys of the Indiana and Illinois Central Railroad passes over these coals. Timber is so abundant, and the demand so light from lack of transportation, that no important attention has been given to it. Immense treasures are here silently sleeping, where a busy population will one day be found, and forge fires will probably send up their flames for many future generations.

I have already noticed J. Carver's coal in section 34. An outcrop of a twenty-inch coal appears also on J. Strong's place in section 19, and two miles north, on D.

Burris' land, which is mined in a stream by removing the soil cover. It does not promise well either for thickness or quality.

A good brown and bright red sandstone is found on J. Strong's land, in section 17, which has been worked considerably the past summer to supply a demand in Clinton county. It does not, so far as tested, show enough uniformity of color to make it very desirable as a building stone. It answers well for foundations. Limestone is found in the northeast portion of this township, showing that we have passed below the coal seams. A good quality of lime is made from this stone. Carboniferous sandstone is found abundant in the bluffs along the streams generally through the township.

Reserve, Penn, Liberty, Sugar Creek and Howard townships not being conformable to the Congressional townships and very irregular in their boundaries, I can complete the description of my reconnoissance best by ascending the streams, rather than by townships.

Leatherwood enters the Big Raccoon one mile above Armiesburg. Just above its confluence, section 7, township 15, range 8, are found five coal seams four of which have been worked. The upper one, M, corresponds with the upper seam at S. Woodard's mines in section 4, and measures twenty inches. It is separated from the seam below by a space of eight feet—three feet of fire clay, four of a greenish argillaceous shale underlaid by a black pyritiferous slate containing fish teeth, *Petrodus occidentalis*, spines and scales, *Cardinia fragilis* and *Aviculopecten rectilateraria*. The second seam which is now most worked is four and a half feet and is marked on the map, L. It yields a good caking coal and an eighteen-inch stratum of block coal. It corresponds to the main seam at Rosedale and Roseville. It also contains bands of iron pyrites and a pyritiferous clay parting. The third seam, K, measures about four and a half feet, and corresponds to the upper seam at Jackman's mines in Raccoon township. Under this seam is a five feet stratum of fire clay, four feet

of argillaceous shales, a soft schistose sandstone ten feet, shales twenty-one feet. Under this is the fourth coal seam overlaid by a thin seam of black slate. It measures about eight inches. It is underlaid by

"Gray shale..... 8 ft. 0 in.

Black sheety slate, with fossil shells
of which *Cardinia fragilis*, *Ortho-*
ceras Rushensis, can be recognized 3 ft. 0 in.

Coal..... 0 ft. 6 in.

Gray shale..... 8 ft. 0 in.

Black pyritiferous shale, passing into
hard gray fossiliferous limestone,
containing *Productus cora*, *P. Cos-*
tatus, *P. Wabashensis*, *Spirifer cam-*
eratus, *Bellerophon carbonarius*,
B. Montfortianus, *Cyathaxonia pro-*
lifera, *Orthoceras Rushensis*, *Cho-*
netes mesoloba, and large stems of
Crinoids"..... 18 in.

(See Prof. Cox's Report for 1869.)

This black pyritiferous shale is often suspected to be plumbago. It will mark paper well, and can be readily cut into pencils, but will burn easily, leaving a slaty ash. This seam is but a few inches above the surface of Leatherwood.

During the past year, about forty thousand bushels of coal have been taken from these coal seams to supply the demand in Montezuma and other places in the vicinity.

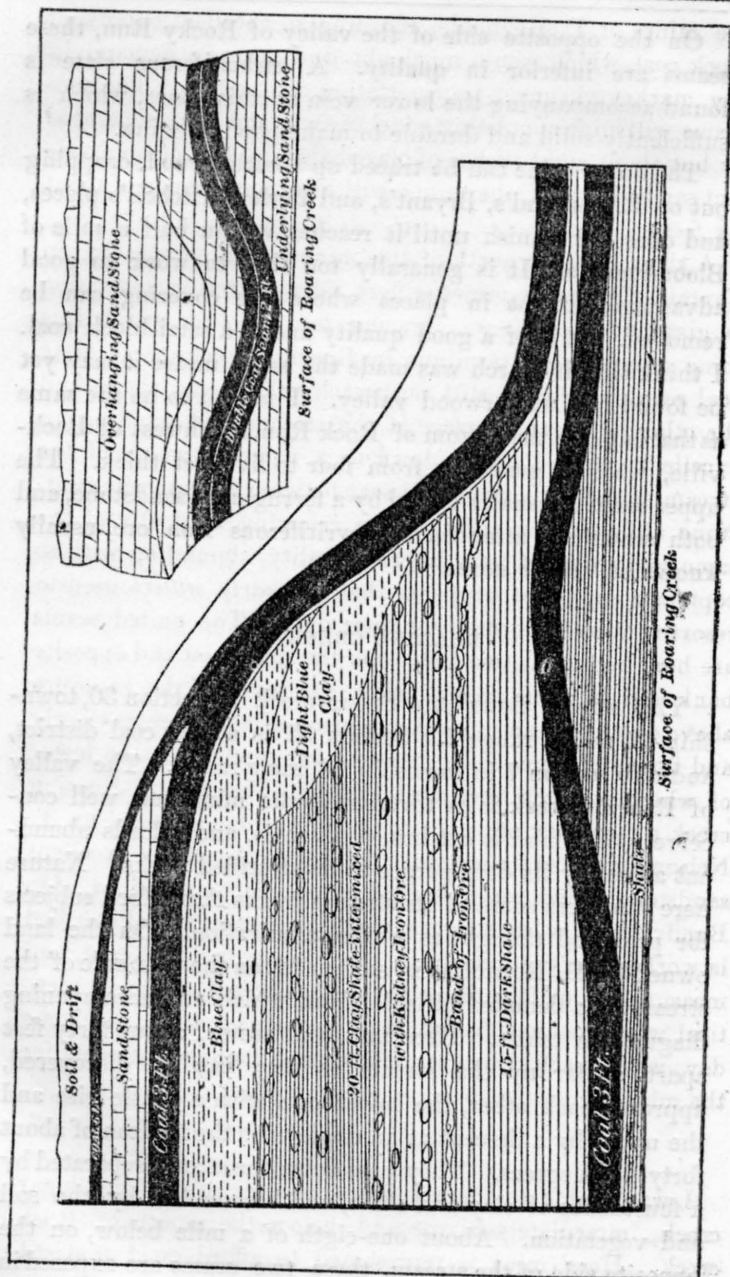
In section 4, on Solomon Woodard's place, L and M crop out in a ravine, where they are mined to good advantage. The upper seam measures about twenty inches, and is separated from the seam below by eight feet of fire clay. The lower seam, L, measures here from four to six feet. A *basin* and *horse-back* occur in this mine. In the latter, at the highest point, it measures four feet; in the *basin* it measures six feet. It is a bituminous coal, and gives good satisfaction in the market.

On the opposite side of the valley of Rocky Run, these seams are inferior in quality. A carboniferous slate is found accompanying the lower vein at this place, which is sufficiently solid and durable to make good flagging.

The upper mine can be traced up Leatherwood, cropping out on R. Outland's, Bryant's, and Perley Mitchell's places, and does not vanish until it reaches within half a mile of Bloomingdale. It is generally too thin to work to good advantage, except in places where the covering can be removed. It is of a good quality and is a semi-block coal. I think that if search was made the seam under it may yet be found in Leatherwood valley. I take it to be the same as that found in the bottom of Rock Run, southwest of Rockville, which is generally from four to five feet thick. The upper seam is usually roofed by a ferruginous sandstone, and both seams are attended by pyritiferous iron ore, usually known as "turtle stones."

ROARING CREEK.

This stream flows into Sugar creek in section 30, township 17 north, range 7. Section 32 is a rich coal district, and also section 7 in township 16, same range. The valley of Roaring creek is as tortuous as the mind can well conceive. The land is cut into peninsulas, and affords abundant access by its deep gorges to its stratified rocks. Nature here discovers some of its strange freaks that afford subjects for profound thought as well as admiration. On the land owned by D. Reynolds, in section 32, on the west side of the stream, is a denuded hillside, from which the accompanying diagram is taken. Here two coal seams, about forty feet apart, as far up the stream as they can be discovered, approach each other, the lower one with a gentle rise and the upper by a descent at an angle with the horizon of about forty-five degrees. They pass down the stream separated by a few inches of clay and shale, and become hid by the soil and vegetation. About one-eighth of a mile below, on the opposite side of the stream, these two seams are exposed in



the mines of D. Reynolds, affording an excellent supply of block coal, which would no doubt find a ready demand in any market whenever transportation can be had. The two seams will mine about thirty inches each, and being separated by but about eight inches of clay shale, and having an excellent sandstone roof, the miner will have a clearance of about six feet.

A short distance north of this mine is a like exposure, in Captain Durman's mines, where very flattering invitation is given to the miner. Tracing the gorge in which this mine occurs to its terminus in Roaring creek, these same coal seams are found still near each other; one above and the other below the surface of the stream, and yielding an excellent coal. Passing down to a narrow passage of the stream at the Rubottom mill seat between the opposite sandstone cliffs, on the right, is the cropping, evidently of the same coal seams of very inferior quality, abounding with so copious a supply of copperas that the *early settlers* used to resort to it as a mordant for their dyes. The united seams are here but about two feet. On the southwest and opposite bank can be seen, much below the level of the exposure above described, an evident extension of these seams closely and tortuously embedded between two sandstones, the lower of which is much the most friable. Passing up Roaring creek a fair show of coal occurs on the land owned by T. Nelson, in the same section. In this locality is an excellent sandstone, which serves a good purpose for foundations. On Bundy's land a little farther east, the upper seam described is worked very successfully. It is here a block coal, and measures about four feet. I think these will be found identical with Buchanan's and Mark's. This locality will some day, when reached by rail, afford abundant inducements for the miner.

SUGAR CREEK.

I was unable to inspect the exposures of coal on Sugar creek, immediately above and below the mouth of Rush creek. Hess' mine is represented to afford good coal. I

did not learn the thickness of the seam. It and the one south of the creek below are perhaps the same as a two-foot seam on the canal, on Wright's place, in section 6, township 16, range 8, roofed by an encrinite limestone. On Josiah Campbell's place, a two and a three-foot seam crop out—the same that will be described in Coke Oven Hollow—and roofed by a two or three-foot seam of limestone. I was unable to find an exposure that would indicate its quality or the paleontological character of the limestone roof. It has not been mined recently and the debris had covered it.

About half way up the hillside, south of the Feeder Dam, is an exposure of coal which has not yet completed the transition from the organic to the inorganic form. It presents a beautiful and conclusive evidence of the vegetable origin of coal—the fern and flag stems and leaves being so perfect that many of them can be separated and then show their forms as perfectly as if they were the relics of a preceding year. Other portions have decomposed, leaving their residuum of carbon in mass, with fossil indications less distinct.

“Coke Oven Hollow” is named from the business conducted in it by Wm. G. Coffin about thirty-five years ago. He had a foundry at “Mount Etna” near by, and procured his pig iron from Cincinnati, Hanging Rock and Pittsburg. It was transported by wagons from Cincinnati, and in order to have loading economically both ways, he mined and coked coal in this Hollow, which reaches Sugar creek just below the Feeder Dam, and would either make sale of it in Indianapolis, Richmond or Cincinnati. This is a forcible illustration of the disadvantages under which industry was placed at that day in contrast with the present, and of the discovery which has since been made of the adaptation of our block coals to the uses of the forge without the waste and loss of coking.

Four coal seams crop out in this valley.

The upper seam is a composition of clay, shale and bitumen, and has a soapy feel. It has a strong resemblance to *black lead*, but when exposed to heat the bitumen will burn

with a blaze until consumed, leaving a fire clay shale as a residuum. It will mark freely like plumbago. It measures about 15 inches. It has been used as a black pigment in oil painting and makes a neat finish. It will also, very probably, serve a good purpose for lubrication. Above this coal is a very desirable sandstone. It has very sharp grit and much of it is so white and clear that I have no doubt it will serve a good purpose for the manufacture of glass. About fifteen or twenty feet below this seam, and under a soapy clay, is found a two-foot coal seam. It is covered by a carbonized limestone. Further down the valley are two superior coal seams; the upper one measures two feet. It is covered by a sandstone roof and has been mined along its outcrop, for smith purposes, for many years, and is much valued. It is a rich caking coal. About 15 or 20 feet of shale separates it from a seam of about 3 feet near the bottom of the ravine which yielded the "Coke Oven" supply before referred to. This seam would be extensively mined if it were not too inaccessible. These seams crop out farther east on S. Jordan's place, and are being mined for the market.

FIRE CLAY AND "SLIP CLAY."

Near the head of Coke Oven Hollow, on R. A. Coffin's land, by some of nature's primitive forces, the strata have been cut through from north to south, and a channel of some 200 yards breadth has been made to a depth of 40 feet or more, the bottom having never been reached. R. A. Coffin's stoneware manufactory stands here. This chasm is filled with an excellent fire clay and it has, in different localities, five different varieties. The upper portion is of variegated color and the proprietor assures me that from it can be made a good article of white ware. Farther down, he is satisfied that the clay will make a fire brick that can not be excelled. He has tested it by exposure to intense heat with brick of best reputation in the market.

Another clay burns to a beautiful reddish-purple and the ware is beautifully smooth.

This fire clay has so good a reputation in the market that he has shipped, by the canal, as much as 619 tons, in one year, to Toledo, Maumee, Delphi and Attica. The supply at this place appears to be inexhaustible. His pottery establishment occupies the place made vacant by mining.

Near by, on S. Jordan's place, a very good clay is also found and on H. Little's place, half a mile west of Bloomington.

The glazing of the stonewares are made by a surface finish of "slip clay," which is a very fine fire clay of such chemical composition that it will melt at a less heat than the clay of which the body of the ware is made. This surface of *slip clay* thus becomes a *flux* and glazes the surface of the ware.

Formerly, potters in this county sent to Lucas county, Ohio, to Maumee City, to Seneca Falls and Albany, New York; to Independence, north of Attica, and to other distant places for supplies, but of latter times a superior article has been found in our own county west of Wildman's nursery, on I. Woodard's place, to which the craft in adjoining counties resort for supplies. It is found also below the falls of Wabash Mill Creek and on Josiah Campbell's place below Feeder Dam. I do not know what judgment has been reached by experiment with the latter. I think it probable that it may be also found on Peache's land in Jackson township. Fire clays extend so nearly all over the county that the supply may be regarded as inexhaustible for all time, and the best varieties can be found.

A few hundred yards above Feeder Dam is a show, above the stream of millstone grit, or conglomerate sandstone. It rises above the stream and sinks beneath it at various points all the way up to the Narrows, where it rises into the uplands and gives place below to the limestone deposit. About one mile above the dam is a fine display of iron ore on a forty-acre lot owned by Milligan of Waveland. This is mainly in kidney nodules in a bed of shale,

but a heavy band or bed of ore is found near the bottom of the stratum. The miner is especially invited to an examination of this spot. In the ravines above is a beautiful display of excellent building sandstone in massive cliffs waiting to be borne to some distant market where it would be of priceless value. Above it, on Ephlin's place, is a nice outcropping of a four-foot coal seam—but, having no solid roofing to protect it from the debris above it, has not been successfully mined. When the demand will justify, a shaft may reach it from the table lands.

A short distance above Milligan's Iron Bank is a legendary spot. In "early times," the Indians, it is said, found a supply of lead in the bed of Sugar creek at this place. They would wade into the stream and feel the ore with their feet and thus procure their supplies. They were not disposed to show the pale faces the spot, and soon after they had left their hunting grounds, the construction of the Wabash and Erie Canal demanded a feeder dam across the stream below and the search for lead in its bottom was made hopeless. The canal dam having gone into decay the stream may in time be reduced to its former level and the lead hunters may yet hope for success.

Between this point and Rockport is another very gratifying exposure of coal. At Starkey's mines, on the south side, much very good bituminous coal has been mined from a two-foot seam. On the north side of the stream, in section 35, on Weaver's and Noland's lands, are found two good coal seams, bedded on fire clay and with sandstone roof. The upper seam is about two feet, and the lower one three feet to three feet five inches.

This coal is about half a mile below the crossing of Sugar creek by the New Albany and Salem Railroad, and can be made very accessible by switching.

On H. Weaver's land is a very excellent chalybeate spring in a deep and romantic valley, which can not fail in time to be a cool summer resort for the invalid, when travel to it shall be made easy.

As we approach Rockport, the conglomerate sandstone

makes a rapid uprising, and the coal seams melt into a friable combination of bitumen, sand and slate.

At Rockport are found on both sides of Sugar creek a high and massive projecting sandstone, which will serve an excellent purpose as abutments for the North and South Railroad bridge that is expected to cross at this place. Near the line of the road is an excellent sandstone, as fine as any I have seen in the county, except the Mansfield stone. It will no doubt some day find its way to Chicago. But little coal is found between this place and Roaring creek. Square Rock Branch, however, is a locality of some interest. It is on Robert Wright's place, about one mile above Rockport. A two-foot seam of black limestone is here exposed, which has very regular lines of fracture. It has over it and under it a black clay which has become incorporated with it so as to give it color. It is quarried in square blocks, from 6 to 18 inches in breadth, and from 6 inches to 1 foot in thickness. It will admit of a good polish, but is not sufficiently indestructible by exposure to the weather to render it valuable for foundations, or for furniture tops. A seam of iron ore is under it, and is also fractured with great regularity into cubical blocks of different sizes. It rests on a fine, carbonized clay, in a stratum measuring about six inches. It has been found to make a good polish for shoe blacking, and will serve a good purpose for lubrication. The experiment has been made to wagon this iron ore to Terre Haute, but the cost of transportation was found too great.

On section 30, township 17, range 7, a very desirable coal crops out on the north side of Sugar Creek, on H. Russell's land. It mines 3 feet 8 inches, and is a rich, semi-block coal. It appears clear of sulphur, has a sandstone roof, and its bed is fire-clay. This seam is found also on J. Moore's place, near the mouth of Mill creek, and just above his mill, in the bed of the stream. It measures about five feet. In the north bank of Mill creek, at this point, is a two-foot seam of coal, under a sandstone cliff. I think it probable that these two seams are the two seen at

Buchanan's, along Roaring creek, and on Mill and Green creeks above. At Moore's place they have not been sufficiently worked to learn their qualities. Some months ago, in time of a freshet, the waters from J. Moore's dam, cut through the coal underneath, and mined it out in large blocks.

In sections 3, 10, 14 and 15, can be found an exceedingly rich coal field. Two seams crop out on both sides of Mill creek. Near the county line, at J. Lawson's mines, the under coal seam measures from five to six feet, and is made up of three strata. The upper is block, the middle a seam of pyritiferous iron ore and cannel coal, and the lower bituminous coal. The amount of sulphur must greatly impair its value. This coal also, is remarkable for its minute septæ of calc spar. Much depends on the care of the miner in assorting this coal for the market.

About a quarter of a mile west is another exposure on G. Barker's land which makes a show of much better coal. It mines from four to five feet. It yielded a good article of block coal in the upper stratum of the seam, and the lower stratum is a rich bituminous coal. About two miles below, on G. Barker's land, a bank had recently been opened, which made a fine show of good block coal, apparently free from sulphur. I saw no indication of a difference in quality as in the mines above. In the bluffs east of Ward's Mills, (Russell's Mills,) two coal seams are found, but they were not sufficiently exposed to indicate their thickness or qualities. One mile and a half west, on Green creek, these coals again crop out. They make a good showing on Barker's and Ratliff's lands. At the former place, the principal mine is in the creek bottom and is mined six feet, the bottom has not been found on account of water. The upper three feet is an excellent block coal and the lower stratum is bituminous. This coal will probably be found as desirable as any coal in the State. In the bank about fifteen feet above, is a good showing of another coal seam. Both seams are roofed by limestone and are separated by shale. The upper seam is but partially exposed. No one appeared to know its thick-

ness. It is considered not less than five feet. These two seams evidently are under the North & South Railroad, from Sugar creek northward into Fountain county, and can be readily approached anywhere by shafts and switches. They are probably the same as the two mined on Coal creek, in Fountain county, which measure three feet three inches and three feet nine inches.

RUSH CREEK.

Along this stream, on C. Farner's land, a good showing of coal is seen, which supplies the smiths in the vicinity, also on Huxford's lands below, but its thickness could not be ascertained. A two-feet seam and a less one are found outcropping in various places along the canal from Sugar creek to Howard, covered by ennerinite limestone. The coal seams, for some cause, become thinner as we approach the Wabash, or in other words, as we leave the circumference of the coal basin. I am inclined to favor Professor Cox's hypothesis, that it was only in shallow water that coal plants grew luxuriantly, and as the waters deepened the coal deposits were less abundant, and would at a sufficient depth entirely fail, hence one of the great irregularities of coal seams, and of their disappearance entirely in certain localities. It is probably for this reason the coal seams maintain their thickness with much uniformity from north to south along the outer rim of the coal basin and diminish in their measures as we follow them westwardly.

NARROWS OF SUGAR CREEK.

The scenery here is wild and picturesque. Heavy cliffs of beautifully white, yellow and cream colored conglomerate sandstones are found on both sides of the stream, and if reached by rail would afford a very desirable supply of stone for building as well as for glass manufacturing. An excellent laminated sandstone is also found here, that can be split into desirable thicknesses for flag stone. Half a

mile above, a *bastard sandstone* is quarried, which is a rare material for flagging. It is on H. Lipsie's land.

The white sandstone above referred to is on J. Lusk's land. The ledge is capped with it as at Roseville. It is a clear white stone with a sharp grit, and crushes easily, but completely resists when exposed to the disintegrating power of the weather.

The "*Narrows*" at this place is a narrow passage of the stream between two perpendicular walls of sandstone about thirty-two feet high and of fifty-five feet span. During high water, the stream rushes with a whirl through this deep gorge with tremendous force. A second and narrower channel is found some fifteen feet deep in the river bed, with offsets on either side, at the bottom of which, I am informed, is limestone.

NEWLIN, M'MURTRY'S AND CANNON'S COALS.

About one and a half miles above "*The Narrows*" is a valley of more than ordinary interest. It gives the following section of the rocks of that locality. It is an interesting fact that here the conglomerate sandstone again gives place to the regular coal and shale foundation; this section reaching down to the water surface without finding it. Near its entrance into Sugar creek, cannel coal is found a few feet below the surface, under the sediment of the stream and near its head. In Cannon and McMurtry's mines it occurs above the block coal, making about an eight or a twelve-inch seam. In the ledge of sandstone found along this valley, the *Lepidodendron* and *Sigillaria* fossils, some of which are seen quite large, instead of being petrified as is usually the case, are converted into cannel coal. Clumps of this fossil coal are seen all through the sandstone without any connection with or being a part of any regular seam, and showing perfect impressions of the bark of these coal plants. About half a mile east of this valley, on W. M. Newlin's land, was found two large blocks of cannel coal, containing about eight cubical feet each, detached from their original stratum,

which will no doubt be found near by. These blocks are now in the collection of the State Geologist at Indianapolis, and weigh 890 pounds. The sandstone in this locality is generally a rich fawn skin color, and answers an excellent purpose for foundations.

The section given commences perhaps fifty or seventy-five feet below the general land surface above.

SECTION OF THE ROCKS IN SECTIONS 25 AND 36, TOWNSHIP 17, RANGE 7.

| | |
|---|------------|
| No. 1. COAL—Semi-block, with a seam of cannel coal on top, varying from ten to twelve inches..... | 4 ft. |
| No. 2. BLACK SHALE..... | 20 ft. |
| No. 3. COAL—Quality not determined..... | 1½ ft. |
| No. 4. IRON STONE—Regularly fractured..... | 4 to 6 ft. |
| No. 5. DARK BITUMINOUS SHALE..... | 15 ft. |
| No. 6. BAND OF IRON ORE..... | 1 ft. |
| No. 7. SHALE and IRON ORE..... | 4 ft. |
| No. 8. SANDSTONE—With cannel coal fossils.. | 30 ft. |
| No. 9. Band of Iron Ore..... | 1 ft. |
| No. 10. COAL..... | 1 ft. |
| No. 11. SHALE—With Iron Ore..... | 40 ft. |
| No. 12. Sugar Creek. | |

GENERAL INFERENCES.

Number of Coal Seams and their Character: Eight coal seams are discoverable in Parke county. The four upper seams appear to be confined to the southwest portion of the county, and to the high land between Rockville and the Wabash, extending as far north as the breaks of Sugar Creek.

Seams K, I, G, and F or A, are found generally through the county, except the northeast portions of Green and Howard townships. They generally diminish in thickness as we follow them westward, but increase in measure as we advance northward. Seams K and I, which are about three

and four feet in the southern portion of the county, measure, north of Sugar creek, five and six feet. K is a semi-block coal. It is well adapted to steam purposes. Sometimes it assumes a block like form when mined, but most generally breaks into cubical forms. Carbonate and sulphate of lime are often traceable in its joints, and sometimes sulphate of iron.

It will not resist the action of the weather equal to some other coals which impairs its value for extensive transportation unless protected. It has more than ordinary volatile matter, and yields a superabundance of smoke when burned. It is valued by blacksmiths on account of the hollow arch formed by agglutination in burning. Its lime and other mineral admixtures unite to form a flux and there results more or less clinker.

Since the Logansport, Crawfordsville and South Western Railroad has opened a way for the transportation of this coal, the corporations of Nye & Co. and the Parke County Coal Company have done an extensive mining business on Sand creek, and I find their coal ranks among the best in the Indianapolis market for locomotives, for general steam purposes, and for grates.

These coal seams are subject to much irregularity on account of the wave-like foundation of the conglomerate sandstone on which they rest, as at Roseville and Big Racoon above Feeder Dam at Rockport, and the "Narrows" along the valley of Sugar creek, coal being found often only in the intervening valleys and cut off by sand ridges which perhaps rose above the surface of the lake in which the coal plants grew.

Who knows but the Creator in his fourth day's work had a special design in giving us access to most invaluable building material through the same medium of transportation which would furnish fuel for the manufacturer and the forge-fire? I know of no locality which brings so many rich treasures into so close proximity.

I had hoped in this survey to be able to discover some reliable law of dip and level that would be a guide to the

miner and enable the land owner to make some probable estimate of what is buried beneath his soil, but the more I traced the variations in level and the uncertainty of even the existence of coal seams at any given locality, the more completely am I satisfied that such knowledge can only be determined by boring and by the shaft.

LIMESTONE, FIRE CLAY AND IRON ORE.

Limestone: This stone is found as a roofing for coal K generally over the county and often in connection with other strata. It is often sufficiently durable to serve for foundation stones and it will burn into a good article of lime.

Should this limestone not prove sufficiently pure for fluxing iron ores, a supply can be readily found of the best material on the eastern borders of the county.

Fire Clay: This valuable material is general and abundant, from a very fair or light color to a dark blue, and sometimes mottled with yellow and red, and from a gritless clay to a silicious admixture which furnish almost any variety of material for the manufacture of wares and the very best of fire brick.

Iron Ore: Banded and kidney ores are abundant throughout the county, and may be estimated to yield about 33 per cent. of iron. Very good clay ironstones are found on Mill, Roaring, Sand, and Little Raccoon creeks. Professor Foster has classified them under the following three heads:

I. *The Impure Carbonates of Iron*, including clay ironstones, in flattened spheroidal masses, and in bands more or less continuous, associated with argillaceous shales.

II. *The Brown Sesqui-Oxides, or Limonites*, intermixed white potters' clay—a modification of No. I.

III. *The Silicious Oxides*, at or near the base of the heavy bedded sandstone, the result, no doubt, of permeating waters highly charged with protoxide of iron.

These ores indicate sufficient richness to justify smelting, whenever facilities can be had for cheap and ready transportation. Especially do they show that the county has all

the desirable ore for admixture with those of Missouri and Lake Superior, for smelting and manufacturing purposes.

Prof. Cox, and Prof. Foster of Chicago, have both given a favorable opinion in reference to the adaptation of the Parke county coals to the manufacture of iron. I can not discover any evidence of deterioration in the quality of the block coals as we advance from Brazil and Carbon to the northern extremity of the county, and shall expect the capitalists to find safe and profitable locations for smelting ores through its entire length, whenever railroad transportation shall prepare the way.

ANALYSIS OF COALS OF PARKE COUNTY.

Buchanan's Coal: Section 23, township 16, range 7. Specific gravity, 1,232; a cubic foot weighs 77 pounds.

| | | | | | | | | | |
|------------------|---|---|------|---|---------------|---|---|---|-------|
| Coke, | - | - | 64.5 | { | Ash, white, | - | - | - | 2.0 |
| | | | | { | Fixed carbon, | - | - | - | 62.5 |
| Volatile matter, | | | 35.5 | { | Water, | - | - | - | 4.5 |
| | | | | { | Gas, | - | - | - | 31.0 |
| <hr/> | | | | | | | | | |
| 100.0 | | | | | | | | | 100.0 |

Sand Creek, Nye & Co.: Sections 22, 27, 28, 34, township 16, range 7. A cubic foot weighs 77 pounds.

| | | | | | | | | | |
|------------------|---|---|------|---|-------------------------|---|---|---|-------|
| Coke, | - | - | 58.5 | { | Ash, white, | - | - | - | 2.5 |
| | | | | { | Fixed carbon, | - | - | - | 56.0 |
| Volatile matter, | | | 41.5 | { | Water, | - | - | - | 3.0 |
| | | | | { | Good, illuminating gas, | - | - | - | 38.5 |
| <hr/> | | | | | | | | | |
| 100.0 | | | | | | | | | 100.0 |

BORINGS.

At Bloomingdale:

| | |
|--------------------------------------|--------|
| Soil..... | 5 ft. |
| Quicksand and gravel..... | 10 ft. |
| Blue clay, hard pan..... | 42 ft. |
| Sand rock, bastard ?..... | 14 ft. |
| Slate..... | 2 ft. |
| Coal, indicated..... | 0 ft. |
| Fire clay..... | 4 ft. |
| Black clay shale with sandstone..... | 27 ft. |
| Gray slate..... | 10 ft. |
| Block coal..... | 3½ ft. |
| Potters' clay..... | 0 ft. |

One and one-half miles north of Bridgton, Charles Caldwell, borer:

| | |
|---|---------|
| Surface drift..... | 12 ft. |
| Hard pan..... | 3 ft. |
| Fire clay..... | 10 ft. |
| Soapstone, sand rock and shale..... | 4 ft. |
| Dark slate..... | 3 ft. |
| Streak of burnt coal, sand rock, dark slate and shale..... | 20½ ft. |
| Sandstone, yellow..... | 5½ ft. |
| Sandstone, blue, with streaks of slate..... | 2 ft. |
| Sandstone, gray..... | 5 ft. |
| White limestone..... | 3 in. |

At Bridgton, north side in bottom of the stream, C. Caldwell, Borer. Crossing of North & South Railroad:

| | |
|----------------------|--------------|
| Drift..... | 8 ft. 0 in. |
| Gray hardpan..... | 5 ft. 0 in. |
| Block coal..... | 2½ ft. 0 in. |
| Fire clay..... | 0 ft. 6 in. |
| Block coal..... | 2½ ft. 0 in. |
| Fire clay..... | 10 ft. 0 in. |
| Slate..... | 1 ft. 2 in. |
| Fire clay..... | 1 ft. 0 in. |
| Sand rock, gray..... | 1 ft. 0 in. |

EXTENT AND VALUE OF THE PARKE COUNTY COALS.

There is an area of about three hundred square miles of workable coals in Parke county, which, I think, may be safely estimated to average a mining thickness of five feet. Each solid foot will weigh seventy pounds, which is one-tenth below the common estimate. Their measure will then be about one and a half billion tons, which, at thirty cents, their value in the mine, may be estimated at about \$440,000,000, or about fifty times the present estimate of the value of the taxables in the county. At three dollars per ton, their cost on the cars, their value will reach the enormous sum of near four and one-half billion dollars, and in the Chicago market twice that sum. This estimate will give us some faint idea of our material hidden wealth that is waiting for the laborer, of the value of the miner's labor, and of the work and expense incurred in transportation, and also of the vast inter-

est the county, State, and the country have in the development and reduction of our mineral resources, leaving our iron, clays and sandstones out of the estimate. It will also suggest the influence such masses of mineral wealth must have on the construction of railroads for their transportation.

THE CONTEMPLATED RAILROADS OF PARKE COUNTY.

It may be discovered that to reach all the varieties of coals in Parke county it is necessary to construct the road which is to bear them to market along their eastern outcrop, instead of across it, since these coals diminish in thickness and in value as we go westward.

The North and South Railroad has successfully found this line, and crossing the streams of the county at right angles it is favorably situated for sending lateral branches up and down the valleys to which coal, stone, lumber, every commodity, can find an easy approach. Other roads will find it convenient as a feeder along its entire line. When it shall be completed I can think of no road that can anticipate a more desirable business.

The Indiana and Illinois Central will pass over some of the best coals in the county and by sending a track down Big Raccoon to Mansfield, may reach the very desirable brown sandstones in that locality, and the good coals on Roaring creek can also be readily approached by switch. When these roads shall be made, they, with the Logansport, Crawfordsville and Southwestern Railroad, will cause Parke county to take an enviable rank among her sister counties in the business of mining and iron manufacture.

SOIL AND TIMBER.

Soil: The surface of Parke county is drift. It varies in different localities. It may be classified into five general divisions:

1. *Alluvium* or river bottoms.
2. Sandy soils.
3. Loamy uplands.
4. Red or yellow clay.
5. Wet or light clay.

These several soils having been brought from other regions by drift or glacial action and by the streams, they bear no relation to the rocks beneath them.

The alluvium in the "river bottoms" is charged with all the elements desirable to promote vegetable growth. Abounding in phosphates, the corn fields which skirt the Wabash and are found on both sides of many of our streams, varying from half a mile to a mile in breadth, are unsurpassed for luxuriant growth and for the abundance of their yield. These soils are washed from the uplands, and when the river bottoms are flooded, a new supply is deposited as sediment. They can by this means be kept in constant cultivation without other fertilization.

2. *Sandy Soils*: These are found in what is usually known as "second bottoms," or the level lands bordering the "river bottoms." They are generally beds of sand and gravel covered by a dark rich soil and are adapted to all kinds of edible grains, and are the most desirable lands for general culture. The drift soils generally contain a great variety of chemical elements and whether in uplands or lowlands are such as are well adapted to all kinds of agricultural productions.

In the western portion of the county lying north of Sugar creek, the upland is a continuous sand bed, presenting a rolling surface; also the southwestern portion of the county south of Rosedale, is, with the exception of the wet prairie previously referred to as the probable former channel of Big Raccoon, much of the same character.

Loamy Uplands: All the uplands of Parke county possess a sufficiency of sand to render them easily pulverized. They are not apt to bake or become cloddy, as is common with purer clays. There is in the upland soils but little uniformity, left as they have been by water currents or glacial action, or both. On the same farm, and on the same level, may be found a rich, black, deep prairie soil, while in an adjacent field will be a yellow or pale earth. Much of the upland surface of Parke county is of this rich, dark, loamy soil, and yields a harvest, in favorable seasons, that competes well with the bottom lands.

Red and Yellow Clays: These clays alternate with the dark loam, and retain well any fertilizing element. They are well adapted to clover and the small grains. This county has no superior for wheat. It rarely fails to give a desirable harvest, and has within the past few years produced a good crop, when in many other portions of the State wheat has failed. These lands yield very excellent corn, especially in the middle and eastern portions of the county, where the surface is more level and retains its *humus* by filtering its waters, rather than parting with them by rapid drainage.

Pale Clays: These clays are common in the flat uplands, and beech and white oak abound on it. It retains moisture well in dry seasons, and when treated generously by a rotation of crops, and turning into it occasionally a clover or blue-grass sod, it proves to be a very productive soil. Under drainage not only takes away the superabundance of water that is left on its surface because of its impervious nature, but induces a porosity which enables the roots of plants to obtain a supply of air as well as to penetrate to the moisture beneath in time of drouth. Some of these lands, which were once thought too poor to be purchased, are now found to make the most desirable farms. They also yield some of the best timber in the county.

Making a general average of all their good and less desirable qualities, including healthfulness, a good Providence has made an excellent average of His blessings in Parke county, and anywhere in it is a good place to live.

TIMBERS.

Parke county embraces in its forests nearly all the desirable timber trees of the State. Its flora embraces the varieties of the prairie as well as of the woodlands. The poplar, oak, walnut, ash, cherry, sycamore, hickory, maple, beech and elm are found in their several varieties for this latitude, and in some portions of the county attain a height, symmetry and diameter unsurpassed in the State.

FLORIDA TOWNSHIP.

The white and burr oak and the poplar are the leading timbers of this township. The walnut is found where the lumberman has not been. The canal on the west, the railroad on the east, and the prairie demand from Illinois, has depleted the timbers in this section of the county.

Liberty, Reserve, Wabash, Penn, Washington, Adams and Raccoon townships have some magnificent forests of excellent timbers, but the demand from Illinois, home consumption, and the railroad and canal have all been busy in seeking the best of them. In many less accessible places, some valuable oaks and poplars are still found.

JACKSON TOWNSHIP.

The deep valleys and numerous hills in this township have hitherto been obstructions to the lumberman, and preserved its fine forests in many places in their primeval beauty and grandeur. I have never seen more desirable poplars or oaks in any place. I measured one white oak at two and a half feet above the ground, and found it sixteen feet ten inches in circumference, and another was about eighteen feet. The poplar is of corresponding girth and very tall. Other timbers are proportionately large. When a railroad can find its way up the Big Raccoon valley, a very profitable business will grow up in this portion of the county in timber and stone.

Union and Howard townships are very analogous to Jackson township in every particular except in the amount of broken land. They have fine forests, and their remoteness from good transportation has prevented their abundant timber from being destroyed.

Green township is now traversed by the Logansport, Crawfordsville & Southwestern Railroad, and the abundance of sawed lumber along the line shows the activity that is at once given to the trade when easy transportation is found to the market.

Along the bluffs of Sugar creek and its tributaries, the

hemlock is seen, which gives a cheer to the winter scenery. Much of it is of desirable size for lumber.

The following classification will exhibit the character of our principal forest trees. I have not deemed it proper here to attempt a full exhibit of the flora of the county. The very excellent report of Prof. A. H. Young, of Hanover, on the flora of Jefferson county, in the Geological Report for 1870, will be found to be a general description of the flora of this region. Parke can add a few prairie flowers which are not found in the highlands of that county.

TREES COMMON TO PARKE COUNTY.

Ash, White or Gray, *Fraxinus americana*—very abundant.

Ash, Blue, *Fraxinus quadrangulata*—common.

Ash, Swamp, *Fraxinus platycarpa*—occasional on low lands.

Beech, *Fagus ferruginea*—very abundant.

Crab Apple, *Pyrus coronaria*—often found; not very abundant.

Buckeye, *Æsculus glabra*—very common in river bottoms, and in rich uplands.

Coffee Nut, *Gymnocladus canadensis*—occasionally found.

Cottowood, *Populus monilifera*—abundant along streams; occasional on the upland.

Dogwood, *Cornaceæ cornus*—very common.

Elm, Red or Slippery, *Ulmus fulva*—common.

Elm, White, *Ulmus americana*—common.

Elm, Hickory, *Ulmus racemosa*—common in low grounds.

Gum, Black, *Nyssa multiflora*—abundant.

Gum, Sweet, *Liquidambar styraciflua*—seen occasionally; rare.

Hackberry, *Celtis occidentalis*—frequent.

Hazel, *Corylus americana*—abundant in the south and west.

Haw, Red, *Cratægus æstivalis*—common.

Haw, Black, *Viburnum prunifolium*—occasional.

Hickory, Shellbark, *Carya alba*—abundant.

Hickory, Western Shellbark, *Carya sulcata*—abundant.

Hickory, Brown or Pignut, *Carya porcina*—frequent.

Hickory, Water, *Carya aquatica*—common along the streams. Excellent for ax-handles.

- Ironwood, or Hornbeam, *Ostrya virginica*—common.
 Honey-Locust, *Gleditschia triacanthos*—occasional.
 Linden, or Basswood, *Tilia americana*—common.
 Maple, Sugar or Rock, *Acer saccharinum*—very abundant.
 Maple, White or Silver, *Acer dasycarpum*—found along the streams.
 Maple, Swamp, *Acer rubrum*—very common.
 Mulberry, *Morus rubra*—common.
 Oak, White, *Quercus alba*,—large and very abundant.
 Oak, Burr, *Quercus macrocarpa*—large and abundant.
 Oak, Chinquapin, *Quercus prinoides*—common.
 Oak, Black Jack, *Quercus nigra*—occasional.
 Oak, Red, *Quercus rubra*—occasional.
 Oak, Pin, *Quercus palustris*—common.
 Pawpaw, *Annona triloba*—very common.
 Poplar, or Tulip Tree, *Lyriodendron tulipifera*—very abundant.
 Red Bud, *Cercis canadensis*—common.
 Spicewood, *Lindera benzoin*—common.
 Spruce, Hemlock, *Abies canadensis*—common on Sugar Creek and tributaries.
 Sycamore, *Platanus occidentalis*—very abundant along the streams; occasional on the upland.
 Walnut, Black, *Juglans nigra*—abundant.
 Walnut, White or Butternut, *Juglans cinerea*—common.
 Water Beech, *Carpinus americana*—common.
 Wild Cherry, *Prunus serotina*—common.
 Willow, *Salix cordata*—common along the streams.

GRAVEL.

Along the "Second Bottoms" of the Wabash, Sugar creek and the two Raccoons, beds of terrace gravel are found, and in the channels of all the streams, gravel and sand bars are numerous, and yield supplies for roads and other purposes in their vicinity. Very frequently deposits of drift gravel, are found along the bluffs in the uplands, of an excellent quality.

WATER POWER.

No county in the State, except Wayne, has so many and desirable mill streams as Parke. Sugar creek, the two Mill creeks and the two Raccoons, are excellent mill streams.

Many of their tributaries, in an earlier day, supplied power for both grist and saw mills, but during the past thirty years they have been gradually failing. The removal of forests, of the underbrush and of the abundant decomposing vegetation, which absorbed and retained the waters from rains, and facilities afforded for drainage by cultivated fields, together with the corresponding facility thus given to the action of the sun and air in the process of surface evaporation, all these causes are combined in the diminution of the currents of our streams. The ruins of saw and grist mills are now found along their valleys where was an active business thirty years ago.

The ingenuity of the age having brought the steam engine to a great degree of perfection and adapted it so completely to every desirable location that the necessity for water power has diminished with the diminution of supply.

There are still great manufacturing interests that must depend largely on a copious supply of water power, and when approached by rail, Sugar creek, Big and Little Raccoon and others of these streams will afford privileges rarely found.

At Mecca, on Big Raccoon, is a large woolen factory, flouring mill and saw mill owned by Lowry and Batman. Excellent flouring mills are also found at Bridgton and Mansfield on the same stream, at Rockport on Sugar creek, and at J. Moor's and C. Ward's on Mill creek.

The general supply of water through the county by spring and wells has been attended by a diminution corresponding to that of the streams. During the past few years wells very generally have required to be deepened, and many springs, which once were regarded as never-failing, have ceased to flow during summer.

The well digger rarely has to encounter stone in sinking for water. If it is not found above, or in the blue clay, he is very sure to meet an abundant supply under it. Water by wells is found in drift, or terrace sand and gravel. Springs often appear along the hillsides among the rocks, but most generally where the valley sinks below the drift.

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Washington: A. Buchanan, Esq., and J. Strong.

Sugar Creek: J. Garrigus, J. Lusk, and J. Moore.

Liberty: J. Wright.

Reserve: S. Woodard, W. B. Morris.

Wabash: Wm. Hixon, Lowry & Batman, and J. Butler.

Florida: Jos. Wilson, J. Blaize, A. Lewis, and J. W. Mark.

Raccoon: Dr. Crooks and D. Kalley.

Jackson. Col. C. Johnson, C. Pruitt, G. W. Hansell, and W. Peach.

Union: L. C. Acker.

Green: R. W. Cooper.

Penn: H. Weaver, R. A. Coffin, Capt. Durman, J. Ephlin, H. Little, P. Mitchell, and S. Jordan.

Howard: W. M. Newlin.

Respectfully submitted,

BARNABAS C. HOBBS.